Los Angeles International Airport

Sustainable Design & Construction Requirements

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Los Angeles World Airports

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Section 1: Introduction

Los Angeles World Airports (LAWA) has a longstanding commitment to advancing sustainability in our built environment and operations, as first articulated in our Sustainability Vision and Principles adopted in 2007. In accordance with the LAWA Sustainable Design and Construction Policy, these LAWA Sustainable Design and Construction Requirements (Requirements) shall apply to LAWA-owned and tenant new construction and major renovation projects that are not able to pursue Leadership in Energy & Design (LEED) Silver certification or better, or Los Angeles Green Building Code (LAGBC) Tier 1 or better, based on project size or scope.[1]

While LEED serves as the guiding framework for LEED-eligible building projects, LAWA recognizes that the LAWA environment is unique and many of its projects do not fit within the LEED or LAGBC Tier 1 framework. These Requirements are intended to apply to a range of building and infrastructure projects, including but not limited to:

- Runways, taxiways, and other airfield flatwork projects
- Roadways, bridges and tunnels projects
- Pavement rehabilitation projects
- Surface parking and stand-alone parking structures projects
- Civil infrastructure (e.g., mechanical, electrical, fire suppression, storm water, and other utility systems) projects
- Exterior lighting projects
- Stand-alone landscaping projects

The Requirements are intended to provide streamlined, user-friendly design and construction standards that promote transparency and accountability while minimizing long-term administrative and oversight costs to LAWA. The Requirements establish technical standards for new construction and renovation projects in the following categories:

1. Planning & integrative design
2. Site planning
3. Energy efficiency & renewable energy
4. Water efficiency & conservation
5. Material conservation & resource efficiency
6. Environmental quality

[1] LAWA Sustainable Design & Construction Policy states that LAWA-owned and tenant buildings projects that meet US Green Building Council (USGBC)'s and LAWA's LEED eligibility criteria as set forth in the policy shall pursue LEED Silver certification or better, unless exempted by LAWA's LEED Review Committee. New construction and renovation projects that are not eligible for LEED certification, or are exempted by LAWA's LEED Review Committee, shall meet LAGBC Tier 1 requirements. Projects that cannot meet LEED eligibility criteria, LAGBC Tier 1 requirements, or are exempted by LAWA, shall comply with LAWA's 2017 Sustainable Design and Construction Requirements.

Implementation of Sustainable Design & Construction Requirements

It is the responsibility of Project Managers (PMs) representing LAWA and tenant projects to ensure projects are designed, documented, and executed in compliance with these Requirements throughout the project life cycle from inception through completion. PMs shall work in collaboration with LAWA's Planning and Development and Environmental Programs Group (EPG). Roles and responsibilities are outlined by each project phase as follows:

Project Initiation:	The LAWA or Tenant PM shall invite EPG to the project kick-off meeting. EPG shall review project scope and bid documents/design criteria/specifications and documentation requirements.
Design Development:	The LAWA or Tenant PM shall invite EPG to the design kick-off meeting, and shall assign a LEED AP/Sustainable Design and Construction Coordinator (SDCC). EPG shall verify sustainable design requirements, and provide comments on design review submissions. The SDCC shall manage the LAWA Sustainable Design and Construction Requirements (LSDCR) compliance process.
Contract Documents:	The SDCC shall integrate applicable LSDCR elements in contract documents. EPG shall review design criteria, specifications, and bid documents prior to issuance for bid. The LAWA or Tenant CM shall consult EPG on bidder's questions related to sustainability.
Construction:	The LAWA or Tenant PM shall invite EPG to the design kick-off meeting, and shall assign a LEED AP/ SDCC, if different from Design Development phase. EPG shall verify sustainable construction requirements. The SDCC shall manage the LSDCR compliance process.
Close-Out/Reporting:	The SDCC shall be responsible for compiling the documentation and submit copies to EPG. Documentation should be consistent with the Reference Standard cited with each requirement presented in Section 2. EPG shall integrate project performance metrics in its annual LAWA sustainability report and other appropriate communications.

Reference Standards

LAWA consulted a range of industry standards in developing the Requirements in order to promote alignment with current best practice in the airport sector and the green construction industry. The following reference standards form the basis of the Requirements:

- LEED v4 for Building Design and Construction (2017)
- LAGBC / CALGreen (2017)
- ENVISION™ Rating System for Sustainable Infrastructure (2015)
- Chicago Department of Aviation Sustainable Airport Manual v3.2 (2014)
- Port Authority of New York and New Jersey (PANYNJ) Sustainable Building Guidelines (2017)
- Port Authority of New York and New Jersey Sustainable Infrastructure Guidelines (2011)
- LAWA Landside Access Modernization Program Design Guidelines (2017)

Section 2: Sustainable Design & Construction Requirements

These requirements seek to reduce impacts related to wasted projected costs, discordant design and planning, transportation impacts, energy use, water use, materials use, human health and comfort impacts, air and water quality impacts, and natural habitat impacts. To accomplish this, sustainable design and construction requirements have been developed for the following six categories:

- Planning & integrative design
- Site planning
- Energy efficiency & renewable energy
- Water efficiency & conservation
- Material conservation & resource efficiency
- Environmental quality

Planning and Integrative Design

These sustainable planning and integrated design requirements bring together all major design and construction disciplines including architecture, planning, structural, landscape, mechanical, electrical and plumbing engineers and trades specialists to collaborate on the most cost effective and efficient way to meet programmatic sustainability goals with lowest environmental impacts.

Requirements	Reference Standard
Ensure that sustainable design goals are considered early in the process of planning and design in order to optimize implementation costs and outcomes.	LAMP Guidelines
Project teams will use an integrated design approach that brings together all, applicable, major design disciplines including architecture, planning, structural, landscape, mechanical, electrical and plumbing engineers and other specialists to collaborate on the most effective way to meet programmatic goals with lowest lifecycle environmental impacts. Where applicable, design teams will include representatives from facilities maintenance and future users to make informed decisions about how projects will be used and maintained.	LAMP Guidelines

Site Development

These sustainable site development requirements aim to reduce environmental impacts by establishing multi-modal transportation options, efficient design and construction of improvements , utilization of sustainable construction practices, reduction of heat island impacts and hardscape areas, and use of landscaped and outdoor areas wherever possible.

Requirements	Reference Standard
Provide vegetated open space equal to 30% of the total project site area (including building footprint), with a minimum of 25% of that outdoor space being vegetated or having overhead vegetated canopy.	LEED
Implement strategies to reduce impact from storm water runoff for at least the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure. Project must conform with City of Los Angeles LID standards.	LEED
Provide secure bicycle parking for 5% of tenant-occupied motorized vehicle parking capacity, with a minimum of one space, and locate bicycle storage within 200 yards from a bicycle network that connects to services that are within a 3-mile bicycling distance of the project boundary.	LEED
Provide changing/shower facilities to support bicycle commuting. Provide at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.	LEED
Designate 5% of all parking spaces used by the project as preferred parking for green vehicles, including low-emitting, fuel-efficient and carpool/van pool vehicles.	LEED
Provide infrastructure including electrical system capacity and raceways for future electric charging stations for 10% of total parking spaces.	LAMP Guidelines
With the approval of the enforcement authority, reduce on-site parking area by 20% by employing strategies to by using on street parking or compact spaces, or by implementing programs that encourage occupants to carpool, ride share or use alternative transportation.	LAGBC Tier 1
Provide vegetative or man-made shading devices for all fenestration on east-, south- and west-facing walls.	LAMP Guidelines
For opaque wall areas use wall surfacing with solar reflectance index (SRI) 25 (aged), for 75% of opaque wall areas.	LAMP Guidelines
Reduce heat island effect- Hardscape. Use one or a combination of strategies 1 through 4 for 75% of site hardscape: 1. Provide shade trees (mature within 5 years of occupancy). 2. Use light-colored materials with an initial solar reflectance value of at least 0.30. 3. Use open-grid pavement system or a pervious or permeable pavement system. 4. Use solar panel arrays to create a canopy shade system.	LAMP Guidelines
Reduce heat island effect. Use roofing materials having a minimum 3-year aged solar reflectance and thermal emittance or install a roof with a thermal mass over the roof membrane, including areas of vegetated (green) roofs.	LAMP Guidelines
Design landscape areas to support low-impact and Integrated Pest Management (IPM)	Envision

techniques that reduce the need for artificial fertilizer, pesticide and herbicide use and pest management. Have operational policies and programs in place to control the application of pesticides and fertilizers. Put runoff controls in place to minimize contamination of groundwater and surface water. Design the landscaping to incorporate plant species that require less use of fertilizers and pesticides. Increase use of composting.	
Coordinate utility work with paving work for roads, runways and parking areas in order to match pavement and utility life cycles.	PANYNJ Guidelines
Select the least disruptive, available technologies for replacement, repair or rehabilitation of existing storm water, sanitary sewer or combined storm/sewer lines based on current best practice.	PANYNJ Guidelines
Promote more efficient and effective construction phasing and staging, minimize construction duration, improve work zone safety, and minimize traffic and mobility impacts, resulting in a reduction of petroleum consumption and air emissions.	PANYNJ Guidelines
All diesel-fueled equipment used for construction shall be outfitted with the best available emission control devices where technologically feasible, primarily to reduce emissions of diesel particulate matter (PM), including fine PM (PM2.5), and secondarily, to reduce emissions of NOx. All off-road diesel-powered construction equipment greater than 50 horsepower shall meet, at a minimum, United States Environmental Protection Agency (USEPA) Tier 4 (final) off-road emissions standards. Use renewable diesel fuel in construction off-road equipment and on-site, on-road trucks, for at least 90 percent of diesel fuel demand.	LAWA Protocol

Energy Efficiency and Renewable Energy

These sustainability requirements were developed to maximize the energy efficiency of building systems through equipment technology, fuel efficiency, building controls, and encourage the use of renewable energy.

Requirements	Reference Standard
Ensure newly installed outdoor lighting power is no greater than 90% of the Title 24, Part 6 calculated value of allowed outdoor lighting power.	LAMP Guidelines
For building projects that include indoor lighting or mechanical systems, but not both, ensure the Energy Budget is no greater than 90% of the Title 24, Part 6 Energy Budget for the Proposed Design Building.	LAMP Guidelines
For building projects that include indoor lighting and mechanical systems, ensure the Energy Budget is no greater than 85% of the Title 24, Part 6 Energy Budget for the Proposed Design Building.	LAMP Guidelines
Use on-site renewable energy for at least 10% of the annual energy use.	Envision
Participate in the local utility's renewable energy portfolio program that provides a minimum of 50% electrical power from green power, carbon offsets, or renewable energy certificates that are Green-e Energy certified and with GHG offsets from projects within the U.S. Maintain documentation through utility billings.	LEED

Reduce overall operation and maintenance energy consumption by at least 10% throughout the project lifecycle. Strategies to reduce energy consumption shall include: • Traction elevators with a regenerative drive system that feeds electrical power back into the building grid when the elevator is in motion • A parked elevator turning off its car lights and fan automatically until the elevator is called for use • An escalator having a VVVF motor drive system that is fully regenerative when the escalator is in motion. • Designing for and employing techniques in steel framing to avoid thermal bridging.	LAGBC Tier 1
Conduct whole building commissioning for all building systems covered by Title 24, Part 6, process systems and renewable energy systems. The Commissioning Authority should be appropriately qualified and suitably independent of the project. Monitor energy systems throughout the project lifecycle. Prepare and maintain a current facilities requirements and operations and maintenance plan for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for heating, ventilating, and air-conditioning (HVAC) & recirculation Systems.	LEED and Envision
Install new or use existing meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption. Track building-level and system-level energy use by permanently installing meters that can record at intervals of 1 hour or less, transmit data to a remote location and store all meter data for at least 36 months.	LEED
Perform a preliminary “simple box” energy modeling analysis before the completion of a schematic design that explores how to reduce energy loads in the building and accomplish related sustainability goals by questioning default assumptions.	LEED
Increase participation in demand response technologies and programs. Design building and equipment for participation in demand response programs through load shedding or shifting.	LEED

Water Efficiency and Conservation

These water efficiency and conservation requirements were developed to proactively improve water efficiency by reducing or eliminating potable water use indoors, in landscape, heating and cooling, and construction practices, with utilizing recycled water, drought-tolerant landscaping, and efficient fixtures.

Requirements	Reference Standard
Reduce overall potable water consumption by at least 25% over industry norms and encourage the use of greywater, recycled water, and storm water for toilet flushing, car/train washing, and/or irrigation. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible must be WaterSense fittings.	LEED
Connect to and use municipal recycled water (purple pipe) for landscape irrigation, toilet flushing, or car or train washing.	LAMP Guidelines
Reduce outdoor water consumption through reducing or eliminating irrigation through plant species selection, irrigation system efficiency, reusing greywater for landscape irrigation and using weather-based irrigation controls.	LEED
Reduce indoor water consumption for specified fixtures and fittings, including faucets, toilets, urinals and showerheads, by an aggregate minimum of 25% below code requirements. All newly installed toilets, urinals, faucets, and showerheads that are eligible must be WaterSense labeled.	LEED and Envision
Use best available water efficiency technologies for cooling towers while controlling microbes, corrosion, and scale in the condenser water system. Conduct a one-time potable water analysis.	LEED
Use recycled water (purple pipe) in place of potable water at concrete batch plant.	LAMP Guidelines
Use pervious pavement for 25% of the site footprint to reduce storm water runoff.	SAM and PANYNJ Guidelines

Implement programs to commission and monitor the performance of water systems and their impact on receiving waters over the long term. Track water usage on a real-time or monthly basis. Install separate submeters as follows:
• For each individual leased, rented or other tenant space within the building projected to consume more than 100 gallon (gal)/day
• Where separate submeters for individual building tenants are infeasible, for water supplied to the following subsystems:
  ○ Makeup water for cooling towers where flow-through is greater than 500 gallons per minute (gpm)
  ○ Makeup water for evaporative coolers greater than 6 gpm
  ○ Steam and hot-water boilers with energy input more than 500,000 British thermal unit per hour (Btu/h).
	LEED and Envision

Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads in the building and accomplish related sustainability goals. Assess and estimate the project's potential nonpotable water supply	LEED

sources and water demand volumes.	
Use reclaimed water for dust control, to the maximum extent practicable. If/where feasible, install raised water tank (Water Buffalo) and connect to reclaimed water lines where available and as directed by LAWA.	LAWA Protocol

Material Conservation and Resource Efficiency

These material conservation and resource efficiency requirements were developed to reduce environmental impacts related to construction materials by minimizing use of virgin materials, increasing use of recycled materials, using rapidly renewable materials, using durable materials and looking for opportunities to reuse materials.

Requirements	Reference Standard
Select at least 30% of building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 100 miles of the project site.	Envision
Divert construction and demolition debris from landfill. All projects must divert at least 75% of construction and demolition debris from at least four material streams, and 100% uncontaminated land-clearing debris (green waste, soil, rocks). OR The entire project must not generate more than 2.5 lbs. of construction waste per square foot of building's floor area respectively.	LAGBC Tier 1 and LEED
Use rapidly renewable materials made from plants harvested within a 10-year cycle, for at least 2.5 % of a project's total materials cost.	LAGBC Tier 1
Use salvaged, refurbished, refinished or reused materials for a minimum value of 5% of the project's total materials cost, based on estimates in design and on actual in construction. Provide documentation as to the respective values.	LAGBC Tier 1
Use materials, equivalent in performance to virgin materials, with a total (combined) recycled content value (RCV) of not less than 20% by weight or volume.	Envision
Use warm-mix asphalt, or equivalent pavement materials that incorporate between 25% and 75% of recycled content, as the project specifications allow. For taxiway projects, target a recycled content of 50% including Reclaimed Asphalt Pavement and Lime Cement Flyash for base course paving materials.	LAGBC Tier 1, SAM, and PANYNJ Guidelines
Conduct a whole building life cycle assessment, including operating energy, showing that the building project achieves at least a 10 percent improvement for at least three of the following impacts: 1. Climate change (greenhouse gases) 2. Fossil fuel depletion 3. Stratospheric ozone depletion 4. Acidification of land and water sources 5. Eutrophication 6. Photochemical oxidants (smog)	LAGBC Tier 1

Improve conditions for workers, protect neighborhood air quality and reduce use of fossil fuel by utilizing warm-mix asphalt in place of hot-mix asphalt.	PANYNJ Guidelines

Environmental Quality

These environmental quality requirements are designed to create an indoor environment that protects and enhances the health and comfort of occupants of the buildings.

Requirements	Reference Standard
Provide temporary ventilation during construction in accordance with Section 121 of the CA Energy Code, CCR, Title 24, Part 6 and Chapter 4 of CCR, Title 8. If the HVAC system is used during construction, use return air filters with a minimum efficiency reporting value (MERV) of 8.	LAMP Guidelines
Conduct an indoor air quality (IAQ) assessment after construction and during occupancy. Choose one of the three options for compliance: • Option 1, Path 1: Flush-out space before occupancy • Option 1, Path 2: Flush-out space during occupancy • Option 2: Conduct air testing after construction, before occupancy, under typical operational conditions	LAGBC Tier 1 and LEED
Develop and implement an IAQ management plan for the construction and preoccupancy phases of the building. The plan must address all of the following: • Meet or exceed all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. • Protect absorptive materials stored on-site and installed from moisture damage. • Use filtration media on HVAC equipment with a minimum efficiency reporting value (MERV) of 8 at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer's recommendations. • Prohibit the use of tobacco products inside the building and within 25 feet (7.5 meters) of the building entrance during construction.	LEED
Select adhesive, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks that comply with local or regional air pollution control or air quality management district rules where applicable or South Coast Air Quality Management District (SCAQMD) Rule 1168 VOC limits.	LAMP Guidelines
Install low emitting carpet, carpet cushion and carpet adhesive in the building interior to meet the requirements of the Carpet and Rug Institute's Green Label program.	LAMP Guidelines
Achieve the threshold level of compliance with emissions and content standards for the product categories listed below: • Paints and coatings must comply with volatile organic compounds (VOC) limits in	LAGBC Tier 1 and LEED

the California Air Resources Board (CARB), Architectural Coatings Suggested Control Measure 2007 and California Department of Public Heath (CDPH) Standard Method V1.1-2010 or SCAQMD Rule 1113 o Threshold: At least 90%, by volume, for emissions; 100% for VOC content • Adhesives and sealants must comply with CDPH Standard Method V1.1-2010 or SCAQMD Rule 1168(including flooring adhesive) o Threshold: At least 90%, by volume, for emissions; 100% for VOC content • Flooring o Threshold: 100% • Use resilient flooring that adheres to CDPH Standard Method V1.1-2010 o Threshold: 100% • Use composite wood products approved by the California Air Resources Board (ARB) as no-added formaldehyde (NAF) based resins or ultra- low emitting formaldehyde (ULEF) resins. o Threshold: 100% not covered by other categories • Ceilings, walls, thermal, and acoustic insulation o Threshold: 100% • Furniture o Threshold: at least 90% by cost	
Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors. • Qualifying entryways are those that serve as regular entry points for building users. • Acceptable entryway systems include, but are not limited to, permanently installed grates, grilles, or slotted systems that allow cleaning underneath. • Roll-out mats are acceptable only when maintained regularly by janitorial contractors as documented in service contract, or by in-house staff as documented by written policies and procedures.	LAGBC Tier 1 and LEED
In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 13.	LAMP Guidelines
Install carbon monoxide (CO) monitors in regularly occupied areas.	LAMP Guidelines
Providing high-quality lighting, by implementing one of the following options below: 1. Provide individual lighting controls (i.e. on, off, midlevel) for at least 90% of individually occupied spaces that enable occupants to adjust the lighting to suit their individual tasks and preferences. 2. Choose four of the following lighting quality strategies. A. For all regularly occupied spaces, use light fixtures with a luminance of less than 2,500 candela per square meter (cd/m2) between 45 and 90 degrees from nadir. B. For the entire project, use light sources with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, or other special use. C. For at least 75% of the total connected lighting load, use light sources that	LAGBC Tier 1 and LEED

have a rated life (or L70 for LED sources) of at least 24,000 hours (at 3-hour per start, if applicable). D. Use direct-only overhead lighting for 25% or less of the total connected lighting load for all regularly occupied spaces. E. For at least 90% of the regularly occupied floor area, meet or exceed the following thresholds for area-weighted average surface reflectance: 85% for ceilings, 60% for walls, and 25% for floors. F. If furniture is included in the scope of work, select furniture finishes to meet or exceed the following thresholds for area-weighted average surface reflectance: 45% for work surfaces, and 50% for movable partitions. G. For at least 75% of the regularly occupied floor area, meet a ratio of average wall surface illuminance (excluding fenestration) to average work plane (or surface, if defined) illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 60% for walls. H. H. For at least 75% of the regularly occupied floor area, meet a ratio of average ceiling illuminance (excluding fenestration) to work surface illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 85% for ceilings.	
Provide quality thermal comfort to site occupants, by implementing one of the following options below: • Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy with errata or a local equivalent. • Design HVAC systems and the building envelope to meet the requirements of the applicable standard: o ISO 7730:2005 o CEN Standard EN 15251:2007	LAGBC Tier 1 and LEED
Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Select one of the following three options. 1. Simulate spatial daylight autonomy and annual sunlight exposure 2. Simulate illuminance levels between 300 lux and 3,000 lux for 9 a.m. and 3 p.m. for 75% of the floor area. 3. Measure illuminance levels between 300 lux and 3,000 lux for 9 a.m. and 3 p.m. for 75% of the floor area.	LAGBC Tier 1 and LEED
Improve conditions for workers, protect neighborhood air quality, and reduce use of fossil fuel by utilizing warm-mix asphalt in place of hot-mix asphalt.	PANYNJ Guidelines
Design exterior wall and roof-ceiling assemblies for buildings exposed to a noise level of 65 dB Leq-1 Hr during any hour of operation meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).	LAMP Guidelines